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GEOPHYSICAL VARIABLES AND BEHAVIOR: XCVII. INCREASED PROPORTIONS OF THE LEFT-SIDED SENSE OF PRESENCE INDUCED EXPERIMENTALLY BY RIGHT HEMISPHERIC APPLICATION OF SPECIFIC (FREQUENCY-MODULATED) COMPLEX MAGNETIC FIELDS[1]

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Summary.—12 young men and women who were not aware of the stimulus order were exposed to 8 configurations of weak (1 microTesla) magnetic fields for 5 min. each, applied primarily over the right parietotemporal region. The numbers of sensed presences along the left side, right side, or front/back, as inferred by button presses at the time of the experience, were recorded. There were significantly ($\eta^2 = .37$) more experiences along the left side than the right side during the presentations of a frequency-modulated (Thomas) pattern with 3-msec. point durations compared to the presentation of its temporally reversed structure or to patterns that were more or less complex. 40% of all left-sided presences occurred during the 5-min. presentation of this specific frequency-modulated pattern. These results suggest that the subjective lateralization of a sensed presence to the left during right hemispheric stimulation by weak magnetic fields is enhanced by the specific temporal structure of the applied field.

The sensed presence, the feeling of the spatial proximity of a sentient being, has been attributed to the experience of the right hemispheric equivalent or homologue of the linguistic-based processes within the left hemisphere that generate the sense of self. We have suggested that the sensed presence is the prototype to mystical and religious experiences attributed to gods and other supernatural beings (Persinger, Tiller, & Koren, 2000; Cook & Persinger, 2001). Applications of complex magnetic fields for 20 min. over the right hemisphere within quiet, darkened experimental settings have been associated with the sensed presence in about 80% of normal people as inferred by their responses to questionnaires after the experiments were completed.

We hypothesized that the application of a specific frequency-modulated pattern (where the duration of each point generating the successive amplitudes, a number between 0 and 255, that composed the complex patterns was 3 msec.) for only 5 min. over the right hemisphere in healthy volunteers should produce a quantitative increase in the incidence of a sensed presence compared to this pattern when each point was 1 msec. Seven women and

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five men, between 19 and 20 years of age, who were enrolled in a first-year psychology course, volunteered to participate for a 2% course credit. The means and standard deviations for scores for Roberts' Inventory (Roberts, Varney, Hulbert, Paulsen, Richardson, Springer, Shepherd, Swan, Legrand, Harvey, Struchen, & Hines, 1990) for the Epileptic Spectrum Disorder were 16 and 24 and for the history of a sensed presence (Persinger & Makarec, 1993) were 33% and 37%, respectively.

Each subject was requested to sit in a comfortable chair, while blindfolded, within an audiological chamber. Subjects were told that the sensed presence is the feeling that something or someone is standing near you. They were instructed to press one of two hand-held buttons to indicate on which side the presence was felt. If the duration of a presence was more than 5 sec., they were instructed to press again. Simultaneous pressing of both buttons would indicate the presence was behind or in front. During the subsequent 40 min., each subject received the same order of eight different combinations of patterns for 5 min. each through four pairs of solenoids embedded in a helmet (Persinger, *et al.*, 2000).

Each pair of the four pairs of solenoids generated the fields for 5 sec. It took 20 sec. for a complete rotation. The order, unknown to the subjects, of the patterns and durations of each value were the multiple complexly sequenced pattern (Persinger, St-Pierre, & Koren, 2001) for 1 msec. and then 3 msec.; 10-Hz sine-wave 1 msec; frequency-modulated (Thomas), 1 msec. and then 3 msec.; the reverse frequency-modulated pattern 3 msec.; and the long-term potentiation 1 msec. and then 3 msec. The average intensity over the scalp from these fields was approximately 1 microTesla (10 milligauss). Button presses were recorded on a strip chart external to the chamber. All analyses involved SPSS software on a Vax 2000 computer.

To assess the robustness of the specific frequency-modulated pattern, the numbers of button presses during the Thomas (3 msec.) and during the reversed Thomas (3 msec.) pattern were recorded for each subject to $0=0$, 1, $2=1$, and $>2=3$. Two-way within-subject analysis of variance (pattern and side of presence) indicated statistically significant differences for the numbers of presences per side ($F_{2,22}=5.96$, $p<.01$; $\eta^2=.35$) and a significant interaction between side and pattern ($F_{2,22}=6.33$, $p<.01$; $\eta^2=.37$). *Post hoc t* tests indicated that the source of the interaction was due to the greater numbers of left-sided presences for the Thomas pulse ($M=.8$, $SD=.8$) compared to the numbers of presences for the other two locations and for all locations of the reversed pattern (grand $M=.2$, $SD=.2$).

The relative numbers of *left*-sided only responses were computed for each of the eight patterns for the nine subjects who reported a presence by dividing each score per pattern by the total numbers of presses and multiplying by 100. The means and standard deviations for the percentages of

responses for the patterns were for 2 (5%); for 9 (12%); for 4 (7%); for 22 (21%); for 40 (35%) (Thomas pattern); for 5 (11%) (reversed pattern); for 7 (12%); for 12 (20%), respectively. *Post hoc* analyses of the statistically significant interaction ($F_{3,24}=5.33$, $p<.01$; $\eta^2=.40$) between point duration and pattern indicated that the primary source of the interaction was due to the enhanced proportions of left-sided presences during the Thomas pattern presented with 3-msec. points compared to 1-msec. points and all other patterns.

Spearman *rho* correlations indicated that total Roberts' score was significantly ($p<.01$) associated with the total numbers of presences (.65) during the experiment as well as these numbers during the multiple sequenced complex pattern only (.80) and during all patterns that contained 3-msec. points (.67). The history of sensed presences was correlated only with numbers of button presses (presences) during the multiple sequenced complex pattern when each point (0 through 255) was 3 msec. (.63).

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